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THE ELECTRIC SUPPLY OF LONDON.

It has often been remarked how little the citizens of a great city know of the immense undertakings and of the capital and labour involved in order to supply them with the necessities and luxuries of life, the constant enjoyment of which has caused them to be looked upon as commonplace. Of the citizens of Greater London how few have any adequate idea of what is required to afford and maintain for them the regular supply of gas and water which they now enjoy! And how few have any knowledge at all of less obvious supplies—for example, of the miles of pipes under our streets which convey, from the pumping station at Wapping, water at a very high pressure, by means of which some 3400 horse-power is available for operating the hydraulic lifts in our large warehouses, hotels, and elsewhere?

Even *savants* are ignorant of the nature of electricity, and therefore term it an 'imponderable fluid,' whilst the more modern among them prefer the simple (!) phrase 'a vibration of the ether.' Hence it is not surprising that erroneous notions are rife as to the supply of electricity, the more so as the generating stations, where the 'electric current' is produced, are generally built in some out-of-the-way spot. Consequently, they are seldom seen by the man in the street, and he will no doubt be surprised when he is informed of large generating stations being dotted about all over the city and suburbs.

The first station for the public supply of the electric current was opened as recently as the year 1885, and was situated in the basement of the Grosvenor Gallery. The company—now known as the London Electric Supply Corporation—which began the supply there, has been supplying current continuously ever since, except during a short interruption caused by a disastrous fire at its station.

Ten years have elapsed, and now in London itself there are some fourteen companies or

local authorities, each with one or more generating stations in its respective district. They control an almost incredible number of miles of wire and cable laid underneath our streets, upon which they have actually expended the large sum of over *four and a quarter millions sterling*. Of this sum the City of London Company is alone responsible for £1,100,000, and the London Electric Supply Corporation, which has now a huge station at Deptford, has spent about £900,000; the former company supplying the E.C. district, and the latter the S.E. and Westminster districts. The number of lamps connected to the mains of these companies had reached at the end of the past year the equivalent of nearly 1,200,000, each of eight candle power—a number which is exclusive of the many arc lamps. The revenue therefrom cannot be much less than £535,000 per annum.

Eight of the undertakings supply what is known as a low tension direct or *continuous* current at a pressure of 100 to 110 'volts' on the consumers' lamps. In this system the lamps are connected direct through the street mains to the generating station where the dynamos generate at a slightly higher pressure. Recently, however, two important companies—the St James and Pall Mall, and the Charing Cross and Strand—have inaugurated a new method in connection with the direct current supply. They now generate a portion of the current they supply at a much higher pressure and transmit it to suitably located sub-stations where the pressure, by means of 'motor generators' or 'rotary transformers,' is reduced to the standard 100 to 110 volts at which it is distributed to the consumers. By this means the amount of copper in the mains is considerably reduced, and the interest on the capital expended on mains forms a not unimportant item in the total cost of the current supplied. It is chiefly for this reason that the remaining six stations generate what is termed a high-pressure alternating current, five generating at a pressure

of about 2000 volts, which, at sub-stations, is reduced to low pressure by passing it through 'alternate current transformers.' The London Electric Supply Corporation, however, with the same object, among others, generate at the extra high pressure of 10,000 to 11,000 volts at Deptford, and this alternating current is 'transformed down' in two stages before it reaches the consumer.

Coming now to the question of cost, the statement that the price of electrical energy to the consumer varies from fourpence to sixpence per Board of Trade Unit, conveys no definite idea to the non-technical reader. But perhaps it will be made clearer by the two following illustrations: One Board of Trade Unit will (1) supply a sixteen candle power lamp for about sixteen and a half hours; or (2), if used for running an electric motor, it will develop about one and a quarter horse-power for one hour. The charge for the current for power purposes is usually less than for lighting, owing to the power in general being required during those hours in which the lamps are not being used. It is naturally the dream of the generating-station engineer to obtain a good 'day load,' so that his expensive machinery and mains may be earning revenue for a longer period than the few brief hours of lighting, especially as an increased 'day load' entails no extra staff.

Compared with other large towns, London is easily at the head for the magnitude of its electrical supply. Paris, for instance, has only an equivalent of about 500,000 eight candle power lamps as compared with the 1,200,000 lamps in London as stated above. Manchester and Liverpool have respectively about 92,000 and 54,000; Glasgow, 70,000; Edinburgh, 43,000; Dublin, 16,000; and Cardiff, 9000. Of the total capital expended in the whole of the United Kingdom for supplying electricity, London has spent more than one-half.

This industry is developing at a very rapid rate—a kind of statement often thoughtlessly made, but in this case true nevertheless. New undertakings are springing up all over the country, and old undertakings are everywhere extending their plant. Of rapid extension a most extraordinary instance has occurred at Edinburgh. The station there, although it has been supplying current for not quite a year, has been compelled to order new machinery, so as to nearly double the present plant, already overloaded.

THE MASTER CRAFTSMAN.*

CHAPTER XIII.—DISSOLUTION.

IT came the very next morning—the day after this lovers' quarrel. The thing happened which Robert had been expecting so long. You all remember how everybody said it was coming—coming—coming. And it came not. The Government, with its narrow majority, still hung on; it still discussed and passed bills. All the papers on one side declared

that the dissolution must come: they said it must come in a month—a week—the day after to-morrow at latest. How could a Cabinet go on with their absurd little majority? But still the Government continued. Then—lo! The thing came—and it seemed to burst upon the world as quite an unexpected thing. We received it as if we had had no idea of its possibility.

Robert took his paper, like most of us, as a part of his breakfast. This morning he opened it with less eagerness than usual, because his mind was disturbed by that little rebellion in the study. He was uncertain, I believe, how to comport himself with the culprit, who now sat opposite him with looks still mutinous. But the thing that he read in the forefront of the paper drove all other thoughts out of his head. And so far as concerned Isabel, they never came back again, as you shall hear if you have patience. There it was, in big letters, 'DISSOLUTION.'

He read the announcement, and the lines that followed, first swiftly, as one always reads things that are surprising. The plain, bald intelligence of an event can be mastered in a moment. The bearings, and meanings, and possibilities, and certainties, and doubtfulnesses of the event take a second and a third reading for fuller comprehension. It is a strange power, that of reading a whole column of news in one glance down a column. We all have it in moments of excitement. The first time, then, that Robert read the news he grasped it all at that one glance; the second time and the third time he read it more slowly, turning over in his mind at the same moment the possible relation of the dissolution of Parliament to himself.

Then he laid down the paper, and gazed across the table at Isabel, who was still under the terror of yesterday, and feared new developments. There was, however, no cause for any such anxiety.

'It has come,' he said solemnly. And then she knew that she was safe for that time, because she divined what had happened.

'What has come?' asked the Captain, astonished, looking up from his plate of bacon.

'What I have been looking for, what is going to make my fortune—the general election has come. That's all. Only the general election! At last!' he sighed. Then he threw the paper across the table. 'You can have it,' he said. 'Any one can have it. There's no more news in it so far as I care. The dissolution of Parliament! That's news enough for me. Quite enough.'

He swallowed his tea and retreated to his own den without more words.

'Oh!' said the Captain thoughtfully, 'it's a general election, is it? Then they'll have an election at Shadwell, I suppose. Ah! And Robert will get in. They all tell me he'll get in. And they say he'll work wonders when he does get in. Very likely. I don't know much about these things, Isabel, but I've lived for sixty-five years, and they've been looking for wonders all the time, it seems to me. When I used to come home—which was once in five years or so—I used to say, "Well, what

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are you doing?" "Looking for wonders." That's what they always said, or words to that effect. And the wonders never came, and, what was more wonderful, we got on quite as well without them. One after the other I remember them all. There was Palmerston and Johnny Russell, and John Bright, and Gladstone, and Bradlaugh, and Balfour—but the wonders never came. Next it's going to be Burnikel, if he's lucky and can make 'em believe in him. Well, well. Burnikel will bring the Wonders. Robert's as good as any of 'em. You'll see. Give me some more tea, my dear."

"Since Robert wants to get into the House, I hope he will. I don't understand why he should want it."

"I hope so too. Because you see, Isabel, since we are alone—it's a delicate subject to talk about—but as I say, since we are alone—the Captain approached the subject with some difficulty—'we may talk a bit about what we can't talk about very well either with George or Robert.'

"What is it, father?"

"Well, my dear, it's about this engagement of yours. I confess I don't like the way it's going on. There! Four years is a terrible long time for a young man to wait. It isn't natural for a young man to wait so long. Do you suppose I would have waited four years?" The Captain laughed. "Four days was nearer the mark. Isabel, do you suppose there's—there's some one else—up the back stairs—some other girl—another wife in another port?"

"If Robert was in love with some other girl he would very soon make an end of his engagement," said Isabel.

The Captain shook his head dubiously, as one loaded with sad experiences, but refrained from pursuing that branch of the subject.

"To be sure," he went on. "Robert's a bookish man; he reads a good deal, reads something every day. It's the only use many of them get of their eyes. But even the readingest of young fellows can't be always thinking about his books. Then he speechifies a good deal—makes 'em up, learns 'em, and fires 'em off; but a young fellow can't be always thinking about his speechifying. Mostly the young fellows of the present day are like those of my day. They are fond of a song and glass, and they like to shake a leg now and again, and to kiss a pretty woman."

"Robert is not one of that kind. He never wants either a song or a glass. And as for shakin'—oh!"

"But to wait for four years—four long years! To go on waiting as if he liked it! It sticks in the gizzard, my dear."

"It was to come off, he told me, when he had done something or other. The election, I expect, was what he meant."

The Captain took up the paper again and read the leading article in the paper twice over, slowly.

"There is no doubt, I suppose," he said, "though the papers do reel off lies every day, that they have got the right end of the stick this time. There will be a general election, and Robert will get in and—"

"Father, do you suppose he really meant the election?"

"What more could he mean? And, as I said before, no man likes to go on being engaged for ever. Wedding bells will be ringing, Isabel. Wedding bells, my dear."

She rose and fled.

When I arrived at ten o'clock, Robert was still in his study, pacing the room in uncontrollable agitation. "The time has come," he cried. "It has come. My chance has come. I feel as if it was my only chance."

"All right. You shall get in. I know nothing whatever about the matter, because I never assisted at an election before; but here I am; take me; take all my time; I will live here if you like; I will look after the yard for you. I have heard of Nottingham lambs being wanted. I will become a lamb. Platforms are sometimes rushed and candidates hustled off. I will get up a stalwart party of hustlers if you like. Candidates are heckled out of their five senses. I will become a heckler of the most venomous kind for your opponents. I can't write epigrams and verses, because that part of my education has been neglected. But here I am, Robert—one man, at least, at your service."

"Thanks, a thousand times. You shall join my committee to begin with. I must make haste to get my committee together; they shall all be working-men except you. I must sit down to prepare an address. I shall have to arrange for an address somewhere or other every night till polling day. It's going to be a splendid time—a magnificent time. By—!" He swore a great oath, for the first time in his life. "My chance has come—my chance has come!"

His voice softened; he sank into his chair and leaned his head upon his hand. Robert was, for the moment, overcome. The spectacle of this emotion pleased me. I suppose no one likes to think of another as altogether composed of cast iron. When any ordinary human being sees the thing for which all his life long he has worked and longed, actually within his reach, that ordinary or average human being is generally a little overcome. Remember that in this case ambition had devoured nearly all other passions. The man had had no youth; none of the delightful freaks, fredaines, and frolics of youth could be recorded of this young man; the unfortunate Robert had never kissed a girl to his subsequent confusion; nor scoured the streets; nor painted Wapping red; nor passed his midnights over cups; he had worked and trained himself for this end and none other. He would have been more than human had he shown no sense of the crisis or juncture of events.

While he sat there, head in hand, Isabel stole in softly like a ghost, and stood beside his chair. I made as if I would go, but she motioned me to stay. By the two red spots in her cheeks I was made aware that something decisive would be said.

He seemed not to observe her presence. She touched his shoulder. "Robert!"

"Isabel!" he started, and sat up, with a quick frown of irritation.

"I have come to congratulate you, Robert," she said timidly.

'Yes, thank you, Isabel. Thank you. Don't say any more.'

'When the general election is over, you will have done what you proposed to do, I suppose. I thought it would be years first. Your ambition, I mean, will be achieved.'

'Achieved? Why Isabel, you understand nothing. That is only a beginning.'

'Oh! Only a beginning?' She looked at first bewildered. Then a smile gleamed in her eyes. And then she sighed—no sigh of satisfaction. 'Only a beginning?' she repeated.

'Why, what else should it be? No one would want to be a member of Parliament only for the pride of it, I suppose.'

'Oh! I thought—'

'Look here, Isabel. I'm glad you came in. After the little misunderstanding of yesterday, it's as well to have a talk. You won't mind George: he knows all about it. Sit down there.' Such was the improvement in his manners that he actually got up and placed a chair for her. As for me, I retired to the seat in the window, not proposing to interrupt the conversation.

'I will just tell you exactly what is the meaning of the situation. I have told no one—no one except George, so far. I didn't tell you because you wouldn't understand. It isn't in your way to see. You've changed a bit since you took to going about with George'—there was not a touch of jealousy in his mind—'straightened yourself, and filled out and improved so, that I hardly know you any more. You're bigger than you were, Isabel—I like a woman to look strong—but still I don't think you can quite understand.'

'I suppose you want to do something great in the House of Commons?'

'Put it that way if you please. I will give you details and particulars.'

Isabel sat facing him. There was now no look of passion or admiration on his face. The hungry look had left his eyes, which, instead, were filled with the eagerness of the coming struggle. There was nothing to fear from him. Indeed at such a moment as this it is not of love that a man can be expected to think: he may most lawfully and laudably think of nothing but himself, even before Helen of Troy herself. But I thought, looking at the two of them, What a strange pair of lovers! The man who had never said a kind word: the girl who looked forward to her marriage with terror!

'Now, Isabel,' he said, 'I will tell you. I am going to enter the House as a plain Master Craftsman, not a gentleman, except that I know their tricks and phrases—I shall be a man experienced in industrial questions and in everything concerned with work practical and theoretical. They want such a man badly. I am going in as an Independent member, like John Bright. When I have made my mark in the House and am a power in it, as John Bright was, I shall perhaps join a party in order to enter the Cabinet. And not till then. And perhaps not at all. As for being one of the rank and file; saying what one is told to say; put up to defend the incompetence and the blundering of the commanders; calling the Irish members, for instance, all the names under the sun one day, and all the opposite names the

next day, just to catch votes; to be everything and all things for votes—votes—more votes—I won't do it. That kind of work will not do for me.'

'Well?' Either Isabel did not understand the point or else it had no interest for her. She looked unconcerned and spoke coldly.

'I told George at the outset: I called upon him on purpose to tell him when he was a stranger. And he fell in with it as soon as he saw that I meant business. At the first go off he thought I was a conceited windbag—one of the ignorant lot turned out by every local Parliament. I could see very well what he thought. When he saw that I was a determined kind of chap, he fell in with it, I say, and helped me all he could.'

'Yes?' Isabel showed no manner of interest in this revelation of political ambition.

'And thought about this and about that thing wanted. Oh, the essentials of the thing were all right—the knowledge and the appearance and the power of speech. But there was one thing wanting. I had never thought of such an omission, and without him I could never have repaired that omission. I'm not ashamed to say, not as things have gone, that what I wanted was manners.'

'Manners!' cried Isabel, showing interest at this point. 'You to want manners?'

'Just what I said myself. But George was right. There's a thousand little ways in which the fellows at the West End are different from us. They are mostly tricks invented to show that they are a superior race. I've learned these tricks, and now, I believe, I can pretend to be a gentleman.'

'You never were anything else.'

'There are gentlemen and gentlemen, Isabel. Have you noticed any change in me?'

'Well, Robert,' she replied timidly, 'I have thought that you were gentler.'

'Of course. One of the things is to repress yourself and pretend not to care. That's what you call being gentle.'

'Power is what you desire more than anything else in the world, Robert. You have always desired it.'

'Always. There is nothing in the world worth having compared with power, Isabel. I want to be a leader—nothing less than that. These are my ambitions. I understand now how it must seem to other people a wild and presumptuous dream, for a man in my position. I don't care a straw what it seems. I realise how great a thing it is, and I am just all the more confirmed in my resolution.'

'And when you are a leader?' It was quite impossible to make Isabel understand the audacity of this ambition. She thought that Robert would simply stand upon the floor of the House of Commons in order to receive the distinctions that would be showered upon him; that everybody would immediately begin to offer him posts of honour, because he was so strong and masterful a man.

'Well, one thing, Isabel. As soon as I am in the Cabinet—say Home Secretary—my first ambition will be achieved. Then as regards a certain promise—'

'How long,' she interrupted quickly, 'do

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you think it will take before you arrive so far?"

"No one can say. A party gets turned out or keeps in. At the quickest time possible for a new man to work his way and be recognised, and put over the heads of other men, one can't very well expect such success in less than five years."

"It can only be done in five years," I interposed for the first time, "under the most favourable circumstances possible—if the present Government gets returned again, if it stays in five years, if you meet with immediate success, if vacancies occur among the chiefs, if you are able to serve in some subordinate capacity. If I were you, Robert, I should say ten years."

"Say ten years," he replied cheerfully. "A year or two is neither here nor there if a man is advancing all the time."

"And a woman is waiting," I added.

"Ten years," said Isabel. "But your side may get turned out."

"They may. Then it might be longer. Of course if a man once becomes a power in the House, he becomes also a power in the country. His influence may go on increasing."

"Ten years. That is a very long time. There will be many changes in ten years."

"Changes? I daresay—I daresay. I hope so. I shall make some changes myself."

"Changes in your own mind, Robert?"

He saw what she meant. "I think not, Isabel. A promise is a promise. When my word is passed, the thing is as good as done."

She got up. "I won't waste your time any longer, Robert. I am glad to hear what your ambitions really mean. It was about that—promise—that I came to see you. I thought the time was come when you might want to fulfil that promise."

"Not yet, Isabel."

"Not yet. I came to set you free—if you wished to be set free."

"To set me free?"

"Because a man like you should not be hampered by an engagement, especially with a woman whom—I mean—you ought to be free. So Robert, I do set you free—if you desire it."

"What makes you think that I desire it, Isabel? I don't desire it."

"That is because you don't know other women. So, Robert, it shall be always and at any time as you desire. We owe so much to you that this is due to you in return. I will wait for the fulfilment of that promise for ten years, twenty years, all my life—if you please. I will cheerfully set you free whenever you desire to be released. That is all, Robert."

"Why," said Robert, "there spoke a good and reasonable girl. But you've given me quite as much in work as I've given you in board and lodging. You owe me nothing. As for being released, ask me if I want to be released when I am the Right Honourable Robert Burnikel, Secretary of State for India. And now let's make an end of thanksgivings and explainings, and get to business. There's lots of work before us."

"Let me help you, Robert. My shorthand and typewriting ought to be of some use to you."

"I wouldn't ask you, Isabel—but you can be of the greatest use. I take it very kindly of you after yesterday"—he held out his hand in token of forgiveness. Isabel accepted it, smiling graciously. "I do, indeed, Isabel, after yesterday's little misunderstanding." He held her hand and looked her straight in the face. And not one touch of softening in his eyes: not the slightest look of love.

Then Isabel took her old place as shorthand clerk, and Robert walked about his room dictating to her and talking to me. I understood for the first time how a man may come to regard a woman as a mere mechanical contrivance for working purposes. He spoke to Isabel, once more his clerk, as if she were a senseless log: he ordered her to write this—to write that. I think that I could never bring myself to forget the sex or the humanity of a girl clerk.

"My career is beginning," said Robert, at eleven o'clock, after the first great speech had been delivered. "It is beginning. Well, I am not afraid. I am not in the least afraid. The House of Commons is no more difficult to move than the music hall of Shadwell. There's only one way to move any class of hearers. You must first talk to interest them—that's grip. I've got the grip of a bulldog. Then you must talk to make 'em cry. I can make 'em cry."

"If you make the House of Commons cry," I said, "they'll shove you up into the House of Lords as fast as they can."

"And you must be able to make 'em laugh. I can make 'em laugh."

"If you can make the House of Commons laugh, Robert, they'll never let you go up to the other House at all."

SCRAP-IRON.

EVERY household has some pieces of scrap-iron which will sooner or later find their way to the furnaces and be again melted up. These may be old rusty locks, a child's broken hoop, a worn-out spade, and old fire-irons, once so well polished and highly cherished. What becomes of it all? Probably this material may be sold to the ragman, in the first place, for a mere trifle. He goes round from house to house getting rags and bones and old iron, in fact, anything that is marketable, until he has got his cart full. Then he makes his way to a scrap-iron yard, where he disposes of his iron for so much per hundredweight according to quality.

A scrap-iron yard is a curious place, where almost every conceivable article of iron finds its way. Iron spoons, kettles, frying-pans, teatrays, locks, keys, horse-shoes, nails, nuts and bolts, hinges, window-frames, steam-boilers, and thousands of other things besides. About two years ago the scrap-yard with which I am connected had about twenty thousand bayonets, which were quite bright, lying in the yard at one time. They had been made at the time

of the Franco-German war, and had never been used, so they eventually found their way into the scrap-yard.

Roughly speaking, there are four classes of iron : (1) wrought iron ; (2) cast iron ; (3) malleable iron ; (4) steel. Wrought iron is iron that can be beaten out on an anvil and welded ; such as blacksmiths use. Cast iron cannot be beaten out, nor welded, for it is too brittle. It has to be poured into moulds whilst in a molten state, and cast into such articles as grates, fenders, pots, pulleys, &c. Malleable iron is different in its nature from either, for it may be poured into moulds like cast iron, but is not nearly so brittle, and comes, so to speak, between the two. It possesses something of the toughness of wrought iron, but cannot be hammered out. It has, however, this quality —it may be dropped on the floor, or even struck with a hammer, without breaking. We all know that if we were to drop a cast-iron pot, or strike it with a hammer, we might crack it and render it useless. Wrought iron may be hammered out, but cannot be run into a mould. Malleable iron, therefore, answers a very important purpose, and is used chiefly for small work. It is largely used for buckles for braces, handles for coffins, and nails for boots. The tips on the heels of boots, and Blakey's boot-protectors, are made out of this metal. If a boot-protector were made of cast iron, as soon as the shoemaker attempted to hammer it on to the boot, it would snap in two.

All the iron that is brought into the yard has to be carefully sorted by an experienced person, and each kind kept by itself. All the wrought iron has to be sent into the Black country, or wherever there are works which make that class of iron. The iron that is made from old wrought scrap is the very best, and is quoted on the market as 'marked bars.' There is no necessity for sending any cast iron out of any large manufacturing town, for there are innumerable places where castings of every description are made, and there is, generally speaking, comparatively little difficulty experienced in disposing of it.

Malleable iron is much more difficult to sell, and there are only a few dealers who will buy it. Steel, like wrought iron, has to be sent to the large iron and steel works to be manufactured over again. Considerable difficulty is experienced in disposing of steel, for it is made of so many different qualities, and for such different purposes, that very few firms care to take it. Those large firms that turn out a particular quality of steel do not care to purchase steel of a very different nature to what they themselves produce.

There are, of course, many other kinds of iron besides those enumerated which come into the yard, and which have to be dealt with. There is a great deal of *swarf* produced, which is of many different qualities, from half dirt up to good clean rough turnings from a

lathe. Then there is *galvanised* iron, such as buckets, coal-hods, and corrugated sheeting, used for roofing purposes, &c. ; and also enamelled iron.

For marketable purposes, enamelled iron is entirely worthless, and galvanised iron is very little better. The proprietor of the yard sets such a small value on either, that he would not buy them at sixpence a cart-load. Still, some of this iron finds its way into every yard and has to be dealt with. It frequently happens that the ragman brings into the yard two or three buckets along with his other iron, and, if he gets the chance, will put these on the weighing-machine with the rest of his material. When the proprietor notices this, he either throws them off the machine, or orders the ragman to do so. After some considerable debate between the ragman and the proprietor, it usually ends with the ragman requesting that he may leave them in the yard, which the proprietor usually permits. This kind of material takes up much room and is very unprofitable. Every bit of galvanised iron has to be put into the fire, and all the coating must be burnt off. Then hollow iron has to be hammered flat, and, after it has been sent away, the price obtained is just about sufficient to cover the expenses incurred.

Enamelled iron is still more difficult to deal with, for the enamel cannot be burnt off. The only thing that can be done with it is to hammer it off the plate, and this never pays. Enamelled iron is, whenever detected, almost invariably sent back with the ragman, no matter how he may entreat to leave it behind. Some large plates are, however, saleable for roofing purposes. As a rule, short, small material is more valuable than long ; for long and bulky iron has to be cut up before it can be sold ; and of course all extra work means extra expense. Thus, a steam-boiler, after having been worked as long as it was safe to do so, is taken out and sold to some scrap dealer, who has it cut into plates before he can sell it to the ironworks. The expense incurred is so great that (at the present price of iron) a boiler intact is only worth a little more than half what it is when cut into plates.

It is surprising how many sets of iron bedsteads come in, and how they are disposed of. The prices they usually fetch are from eleven to fifteen pence, according to weight. Many of these sets are in a very good condition ; in some cases only the casters are gone, and a lath or two broken, or sometimes a socket casting broken off. In many instances the housewife, on obtaining a superior set of bedsteads, sells the old ones to the ragman for a mere trifle. In the same way useful articles of various descriptions come into the yard. I know a couple of men who come regularly to the yard to look for any bargains in the bedstead line. There are a large variety in stock, sometimes as many as forty or fifty sets. They look among these and pick out some of the best sets, getting sides and laths to fit ; these, when complete, cost from one and nine-pence to half-a-crown, according to the weight

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They then paint them up and put them into a saleroom.

There are, however, comparatively few bedsteads sold in this way; by far the greater number being broken up, sorted, and sent to the ironworks. The laths are usually sold to men who come into the yard and purchase them for the purpose of cutting out small washers. There are many other useful things found in the yard, such as gas-piping, pulleys, lengths of shafting, broken vices, scales, &c. These are bought by men who call at the yard, and sometimes get good bargains. Two or three blacksmiths call frequently and pick out useful iron that they can work up; and, as they can buy this at reasonable rates, it pays them for their trouble.

A word now about the *ragmen* who bring the scrap-iron to the yard. They are a very ignorant, drunken, dissolute set, belonging to the very lowest grade of society; but they are cunning at a bargain, and disposed to quarrel over the merest trifle. Our weighing-machine is sufficiently large to weigh a wagon and load up to ten tons, and all the stuff that passes over the machine is weighed to seven pounds. The machine-house is a large one, and to satisfy those who bring the material, we invite them in to see it weighed. But, as a rule, they do not need an invitation; they come in on their own account, and I have known them, when I have been away for a few minutes, walk in and weigh the stuff for themselves.

On one occasion, I found two rough-looking customers in the place. Their cart was on the machine; they had weighed it and made it come to about eight and a quarter hundredweight. 'That's the weight,' I was told. However, I was not prepared to take their weight, although I saw that the beam was up, and seemed to indicate it correctly enough. As I ran the ball up and down the beam I was surprised to find that it was still up, and that somehow or other the machine was not acting properly. It was some time before I found out what was the matter; they had placed some old files in such a position under the hanger that, when the beam was pushed up, it could not come down again. Having cleared away this obstruction, I reweighed the stuff, and found that it was two hundredweight less. These men usually run their cart on to the machine, and weigh it, *gross weight*, cart, bag, and anything else. After they have emptied their stuff out of the bag, if you are not watching them, they throw the bag on one side and do not have it weighed back, and then when they are going away pick it up and throw it into the cart so unconcernedly that one might suppose it had not been done designedly. I have many a time weighed a cart, and then, after the iron has been tipped up, the cart has been run into the street so that it might not be weighed back again. These tricks are, however, practised only by fresh comers.

How often I have watched them through the window build up a nice little pile, very presentable to the eye, with all the rubbish at the bottom! If there should be any

enamelled plates, or other unsaleable stuff, it is sure to be well covered over. But as a rule these little tricks are easily discovered; we make a practice of pulling the pile about, so as to show the nature of its materials.

THE MAHALAPSI DIAMOND.

CHAPTER II.

THEY breakfasted betimes at the Staarbruckers, and after the meal, Nina having gone into the garden, Otto proceeded to open his proposal to the young Englishman, who had stayed this morning to breakfast. He hinted first that there might be serious difficulty in disposing of so valuable a diamond, and, indeed, as Frank already recognised, that was true enough. The proper course would be to 'declare' the stone to the authorities; but would they accept his story—wildly improbable as it appeared on the face of it?

No one in England can realise the thick and poisonous atmosphere of suspicion and distrust in which the immense diamond industry of Kimberley is enwrapped. Its miasma penetrates everywhere, and protected as is the industry by the most severe and brutal—nay, even degrading—laws and restrictions, which an all-powerful 'ring' has been able to force through the Cape Parliament, no man is absolutely safe from it. And, even Frank, an employé of the great De Beer's Company itself, a servant of proved integrity and some service, might well hesitate before exposing himself to the tremendous difficulty of proving a strong and valid title to the stone in his possession.

'Well, Frank,' said Staarbrucker, 'have you made up your mind about your diamond? What are you going to do with it?'

'I don't quite know yet,' answered Frank, taking his pipe out of his mouth. 'It's a deuced difficult puzzle, and I haven't hit on a solution. What do you advise?' Here was Otto's opening.

'Well, my boy,' he answered, 'I've thought a good deal over the matter, and in my opinion, you'd better keep your discovery to ourselves at present. Now I'm prepared to make you an offer. I'll find the expenses of a prospecting trip to the place where your crocodile came from, and take a competent miner up with us—I know several good men to choose from—on the condition that, in the event of our finding more stones, or a mine, I am to stand in halves with you. I suppose such a trip would cost three hundred pounds or thereabouts. It's a sporting offer; what do you say to it?'

'No, I don't think I'll close at present,' returned Frank; 'I'll take another few hours to think it over. Perhaps I'll mention the matter to an old friend of mine, and take his advice.'

Staarbrucker broke in with some heat: 'If you're going to tell all your friends, you may as well give the show away at once. The thing will be all over "camp,"* and I wash my

* Kimberley is still called by its early name of 'camp' among old inhabitants.

hands of it. Let me tell you, you're doing a most imprudent thing.'

'Really,' said Frank, coolly enough, 'the stone is mine at present, and I take the risk of holding it. I haven't asked you to run yourself into any trouble on my account.'

'No,' returned the other, 'but you are under my roof, and if it became known that I and my sister knew of this find, and of its concealment, we should be practically in the same hole as yourself. Now, my dear boy, take my advice, keep your discovery to yourself till we meet this evening, and let us settle to run this show together. You won't get a better offer, I'm sure of it.'

'Understood; I promise nothing,' said Frank, who scarcely relished Staarbrucker's persistency. 'I'll see you again to-night.'

After dinner that evening, the two men met again. Frank reopened the topic, which had meantime been engrossing Staarbrucker's thoughts to the exclusion of all else.

Frank at once declared his intention of going to see the manager next day, to tell him of the find and take his advice.

Otto Staarbrucker made a gesture of intense annoyance. 'You are never going to play such an infernal fool's game as that, surely?' he burst out. 'I've made you a liberal offer to prospect thoroughly at my own expense, the place where that stone came from, on half shares. If you accept my offer, well and good. If you don't, I shall simply tell your little story to the detective department, and see what they think of it. Think it well over. I'll come and see you to-morrow morning, early.'

He turned on his heel, and went out of the house.

Frank had felt a little uncomfortable during Otto's speech, but now he was angry—so indignant at the turn affairs had taken, and at the threat, idle though it was, held out to him, that he determined next day to quit the house and have done with the man altogether. He had never liked him. True, there was Nina. Nina—so utterly different from her brother. He should be sorry indeed to leave her. She had a very warm corner in his heart. He would miss the pleasant evenings spent in her company. What should he do without her merry *camaraderie*, her kindly, unselfish ways, the near presence of her bewitching face, and her evident preference for his company? At that moment Nina entered the room. Frank looked, as he felt, embarrassed, and the girl saw it at once.

'What's the matter, Mr Farnborough? You ought to look happy with that eight hundred pound diamond of yours; yet you don't. Aren't things going as you like, or what is it?'

'No,' answered Frank, reddening, 'things are not going quite right. Your brother has made me a proposition, which I don't quite see in his light, and we've rather fallen out about it. However, my tiff with Otto need make no difference between you and me. We haven't quarrelled, and I hope you won't let our old friendship be broken on that account.'

'Indeed, no,' returned Nina, 'why should it? But I shall see Otto and talk to him; I can't have you two falling out about a wretched diamond, even although it is a big one. Since

you came here, things have been so much pleasanter, and—' the girl paused, and a flush came to her face, 'well, we can't afford to quarrel, can we? Friends—real friends, I mean—are none too plentiful in Kimberley.'

Nina spoke with a good deal of embarrassment for her, and a good deal of feeling, and she looked so sweet, such an air of tenderness—not unusual to her—shone in her eyes, that Frank was visibly touched.

'Nina,' he said, 'I'm really sorry about this affair. Perhaps in the morning it may blow over. I hope so. I have had something on my mind lately, which perhaps you can guess at, but which I won't enter upon just now. Meanwhile, don't say anything to your brother about this row. Let us see what happens tomorrow. Heaven knows I don't want to quarrel with any one belonging to you.'

Early next morning, while Frank sat up in bed sipping his coffee and smoking a cigarette, the door opened, and Otto Staarbrucker entered the room. He had been thinking over matters a good deal during the night, and had made up his mind that somehow he and Frank must pull together over this diamond deal. His big, florid face was a trifle solemn, and he spoke quietly for him. But he found Frank as firm as ever, against his utmost entreaties.

'I've thought it all out,' Frank said; 'I don't like your plan, and I mean to show our manager the stone to-day, and tell him all about it. I think it will be best in the long-run.' He spoke quietly, but with a mind obviously quite made up.

The blood ran to Otto's head again; all his evil passions were getting the upper hand. 'Frank, take care,' he said. 'You are in a dangerous position about this diamond. I don't think you quite realise it. Once more I warn you; don't play the fool. Make up your mind to come in with me and we'll make our fortune over it.'

Frank began to get angry too. 'It's no use harping on that string further. I'm not coming in with you under any circumstances, and you may as well clearly understand it, and take no for an answer.' Then, half throwing off the light bed-clothing, 'I must get up and have breakfast.'

Otto glared at him for a second or two before he spoke. 'For the last time I ask you, are you coming in with me?'

There was clear threat in the deliberation of his tones, and Frank grew mad under it.

'Oh, go to the deuce,' he burst out, 'I've had enough of this. Clear out of it; I want to get up.'

Otto stepped to the door. 'I'm going now to the detective office; you'll find you've made a big mistake over this. By Heaven! I'll ruin you, you infernal, stuck-up English pup!'

His face was red with passion; he flung open the door, slammed it after him, and went out into the street.

Frank heard him go. 'All idle bluff,' he said to himself. 'The scoundrel! He must have taken me for an idiot, I think. I've had enough of this, and shall clear out, bag and baggage, to-day. Things are getting too unpleasant.'

He jumped up, poured the water into his bath, and began his ablutions.

Meanwhile, Otto Staarbrucker, raging with anger and malice, was striding along the shady side of the street, straight for the chief detective's house. Despite his tinge of Jewish blood, there was in his system a strong touch of the wild ungovernable temper, not seldom found in the Teutonic race. It was not long before he had reached the detective's house, and announced himself. Carefully subduing, as far as possible, the outward manifestation of his malicious wrath, he informed the acute official, to whom he was, at his own request, shown, that his lodger, Mr Farnborough, was in possession of a valuable unregistered diamond, which he stated he had found in a stuffed crocodile's interior, or some equally improbable place. That to his own knowledge the stone had been unregistered for some days, although he had repeatedly urged Farnborough to declare it; that the whole surroundings of the case were, to his mind, very suspicious; and, finally, that, as he could not take the responsibility of such a position of affairs under his roof, he had come down to report the matter.

The detective pricked up his ears at the story, reflected for a few moments, and then said: 'I suppose there is no mistake about this business, Mr Staarbrucker. It's, as you know, a very serious matter, and may mean the "Breakwater." Mr Farnborough has a good position in De Beers, and some strong friends, and it seems rather incredible (although we're never surprised at anything, where diamonds are in question) that he should have got himself into such a mess as you tell me.'

'I am quite certain of what I tell you,' replied Staarbrucker. 'If you go up to my house now, you'll find Farnborough in his bedroom, and the stone's somewhere on him, or in his room. Don't lose time.'

'Well,' responded the detective, 'I'll see to the matter at once. So long, Mr Staarbrucker!'

Mr Flecknoe, the shrewdest and most active diamond official in Kimberley, as was his wont, lost not an instant. He nosed the tainted gale of a quarry. In this case he was a little uncertain, it is true; but yet there was the tell-tale taint, the true diamond taint, and it must at once be followed. Mr Flecknoe ran very mute upon a trail, and in a few minutes he was at Staarbrucker's bungalow. Staarbrucker himself had, wisely perhaps, gone down to his store, there to await events. Vitriolic anger still ran hotly within him. He cared for nothing in the world, and was perfectly reckless, provided only that Frank Farnborough were involved in ruin, complete and utter.

Mr Flecknoe knocked, as a matter of form, in a pleasant, friendly way at the open door of the cottage, and then walked straight in. He seemed to know his way very completely—there were few things in Kimberley that he did not know—and he went straight to Frank's bedroom, knocked again and entered. Frank was by this time out of his bath, and in the act of shaving. It cannot be denied that the detective's appearance, so soon after Staarbrucker's threat, rather staggered him, and he paled per-

ceptibly. The meshes of the I.D.B.* nets are terribly entangling, as Frank knew only too well, and I.D.B. laws are no matters for light jesting. Mr Flecknoe noted the change of colour.

'Well, Mr Flecknoe,' said the younger man, as cheerily as he could muster, for he knew the detective very well, 'what can I do for you?'

'I've come about the diamond, Mr Farnborough; I suppose you can show title to it?'

'No, I can't show a title,' replied Frank. 'It came into my possession in a very astounding way a day or two since, and I was going to tell the manager all about it to-day and "declare" the stone.'

Frank then proceeded to tell the detective shortly the whole story, and finally, the scene with Staarbrucker that morning.

Flecknoe listened patiently enough, and at the end said quietly: 'I am afraid, Mr Farnborough, you have been a little rash. I shall have to ask you to come down to the office with me and explain further. Have you the stone?'

'Yes, here's the stone,' replied Frank, producing the diamond from a little bag from under his pillow, and exhibiting it on his palm. 'I won't hand it over to you at this moment, but I'll willingly do so at the office in presence of third parties. Just let me finish shaving, and I'll come along.'

'Very well,' said Mr Flecknoe, rather grimly, taking a chair. 'I'll wait.'

That evening, some astounding rumours concerning a De Beer's official were afloat in Kimberley. Farnborough's absence from his usual place at the 'Central' *table d'hôte* was noticed significantly, and next morning the whole camp was made aware, by the daily paper, of some startling occurrences. Two days later it became known that Frank Farnborough had been sent for trial on a charge of I.D.B.; that his friend Staarbrucker had, with manifest reluctance, given important and telling evidence against him; that bail had been, for the present, refused, and that the unfortunate young man, but twenty-four hours since a universal Kimberley favourite, well known at cricket, football, and other diversions, now lay in prison in imminent peril of some years' penal servitude at Capetown Breakwater. The camp shook its head, said to itself 'Another good man gone wrong,' instanced, conversationally over the bars of the 'Transvaal,' 'Central,' and other resorts, the cases of many promising young men who had gone under, victims of the poisonous fascination of the diamond, and went about its business.

But there was a certain small leaven of real friends, who refused utterly to believe in Frank's guilt. These busied themselves unwearingly in organising his defence, cabling to friends in England, collecting evidence, and doing all in their power to bring their favourite through one of the heaviest ordeals that a man may be confronted with.

The morning of the trial came at last. The season was now South African mid-winter;

* I.D.B., Illicit Diamond Buying, a highly criminal offence in South Africa.

there was a clear blue sky over Kimberley, and the air was crisp, keen, and sparkling under the brilliant sunlight. The two judges and resident magistrate came into court, alert and sharp-set, and proceedings began. Frank was brought in for trial, looking white and harassed, yet determined.

As he came into court, and faced the crowded gathering of advocates, solicitors, witnesses, and spectators—for this was a *cause célèbre* in Kimberley—he was encouraged to see, here and there, the cheering nod and smile, and even the subdued wave of the hand, of many sympathising friends, black though the case looked against him. And he was fired, too, by the flame of indignation as he saw before him the big, florid face—now a trifle more florid even than usual from suppressed excitement—and the shining, up-turned eyeglasses of his arch-enemy and lying betrayer, Otto Staarbrucker. Thank God! Nina was not in the assembly; she, at least, had no part or lot in this shameful scene. And yet, after what had passed, could Nina be trusted? Nina, with all her friendliness, her even tenderer feelings, was but the sister of Otto Staarbrucker. Her conduct ever since Frank's committal had been enigmatical; her brother, it was to be supposed, had guarded her safely, and, although she had been subpoenaed upon Frank's behalf, she had vouchsafed no evidence, nor given a sign of interest in her former friend's fate.

Counsel for the prosecution, a well-known official of Griqualand West, opened the case in his gravest and most impressive manner. The offence, for which the prisoner was to be tried was, he said, although unhappily but too familiar to Kimberley people, one of the gravest in the Colony. One feature of this unhappy case was the position of the prisoner, who, up to the time of the alleged offence, had borne an unimpeachable character, and had been well known as one of the most popular young men in Kimberley. Possibly, this very popularity had furnished the reason for the crime, the cause of the downfall. Popularity, as most men knew, was, in Kimberley, an expensive luxury, and it would be shown that for some time past, Farnborough had moved and lived in a somewhat extravagant set. The learned counsel then proceeded to unfold with great skill the case for the prosecution. Mr Staarbrucker, an old friend of the prisoner, and a gentleman of absolutely unimpeachable testimony, would, with the greatest reluctance, prove that he had by chance found Farnborough in possession of a large and valuable stone, which the prisoner—apparently surprised in the act of admiring—had alleged, in a confused way, to have been found—in what?—in the interior of a dried crocodile! One of the most painful features of this case would be the evidence of Miss Staarbrucker, who, though with even more reluctance than her brother, would corroborate in every detail the surprising of the prisoner in possession of the stolen diamond. He approached this part of the evidence with extreme delicacy, but in the interest of justice, it would be necessary to show that a friendship of the closest possible nature, to put it in no tenderer light, had latterly sprung into existence between the prisoner and the young lady in question.

Clearly then, no evidence could well be stronger than the evidence, wrung from Miss Staarbrucker with the greatest reluctance and the deepest pain, as to the finding of Farnborough in possession of the diamond, and of the lame and utterly incredible tale invented by him on the spur of the moment, when thus surprised by the brother and sister. The evidence of Mr and Miss Staarbrucker would be closely supported by that of Mr Flecknoe, the well-known Kimberley detective, who had made the arrest. Mr Staarbrucker, it would be shown, had urged upon the prisoner for two entire days the absolute necessity of giving up and 'declaring' the stone. Finally, certain grave suspicious had, chiefly from the demeanour of Farnborough, forced themselves into his mind. One more interview he had with the prisoner, and then, upon his again declining absolutely to take the only safe and proper course open to him, Mr Staarbrucker had, for his own protection, proceeded to the detective department, and himself informed the authorities of the presence of the stone. No man could have done more for his friend. He had risked his own and his sister's safety for two days—he could do no more. The prisoner's statement to the Staarbruckers and to Mr Flecknoe was that the crocodile skin came from the Mahalapsi River in North Bechuanaland, and that the stone must have been picked up and swallowed by the living reptile somewhere in those regions. He, counsel, need hardly dwell upon the wildness, the ludicrous impossibility, of such a theory. Three witnesses of the highest credibility and reputation, well known in Kimberley, and in the markets of London and Amsterdam, as experts in diamonds, would declare upon oath that the so-called 'Mahalapsi Diamond'—the learned counsel rolled out the phrase with a fine flavour of humorous disdain—came, not from the far-off borders of the Bechuanaland river, but from the recesses of the De Beer's mine—from Kimberley itself! *

Here there was a visible 'sensation' (that mysterious compound of shifting, whispering, and restless movement) in court. 'Yes,' continued the advocate, 'the stone is beyond all shadow of a doubt a De Beer's stone. It is not registered. The prisoner has no title to it; the diamond is a stolen diamond; and if, as I have little doubt, I shall succeed in proving my facts to you clearly and uncontestedly, the prisoner must take the consequences of his guilt. If indeed he be guilty, then let justice, strict but not vindictive justice, be done. Kimberley, in spite of the severest penalties, the most deterrent legislation, is still eaten up and honeycombed by the vile, illicit traffic in diamonds.'

The advocate warmed to his peroration, and, as he was a holder of De Beer's shares, he naturally felt what he said. The court was already becoming warm. He took out his handkerchief

* It is perfectly well known in South Africa that diamond experts can at once pick out a particular stone and indicate its mine of origin. Practice has created perfection in this respect, and stones, whether from De Beers, Du Toit's Pan, Bultfontein, the Kimberley mine, or the Vaal River, can be at once identified.

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and wiped his brow. It is hot work delivering an important speech in South Africa. 'In the name of Heaven, I say,' he continued, striking the desk with his clenched fist, 'let us have done with this vile and monstrous traffic, that renders our city—the foremost city in South Africa—a byword and a laughing-stock among the nations.'

S H O E B U R N E S S .

A FEW years ago we gave in the pages of this *Journal* (No. 380, April 11, 1891) some account of Woolwich arsenal, the birthplace of *Woolwich Infants*, as the great guns there manufactured are sometimes fancifully called; and a little later (No. 452, August 27, 1892) we described the small-arms factory at Enfield. It may not be now uninteresting to our readers if we say something about the portion of the county of Essex in which experiments are carried out with the guns, large and small, manufactured at these two places, and briefly mention some of the experiments themselves, and their results.

A ness may be best described as a blunt-shaped, low-lying tongue of land running out into the sea, hardly a point, much less a promontory or headland. The entrance to the estuary of the Thames is guarded by two such natural features, exactly opposite to one another. That to the north is known as Shoeburyness, and that to the south is called Sheerness. Between the two the great river finds its way to the German Ocean, amidst, especially on the northern side, shoals and sandbanks. Sheerness is a protected arsenal and dockyard which guards the mouth of the Medway, and has been selected for this purpose on account of the excellent anchorage which the mouth of that river affords for large ships of war. Shoeburyness, on the other hand, has become a military station, not because of any advantages afforded by its position on the sea, but because it consists of a large tract of dreary marshes, flanked to the south and east by the far-stretching Maplin sands, which are almost entirely uncovered at low-water. These sands form the attraction from a scientific point of view, and why so, we shall see later on. The place is said to take its name from the words *Seo* and *Byrig*, which signify—the *Byrig*, or settlement, in the shaw or wood. Here Hastings, the viking, constructed one of his sea-coast fortifications or camps, the lines of which may still be traced. Of other ancient history of Shoeburyness there is none.

The first connection of Shoeburyness with modern military matters appears to have been made so lately as the time of the Crimean war, when the flat, rough marshland was used as a camping ground for men and horses with the view of accustoming both to the hard work which lay before them in the east. This tract of country has thus become the property of the War Department, and that administrative body soon found another use for it, in which the half-submerged sands were to bear an important part. The idea was conceived that targets might be erected on these sands, and that the

projectiles which were fired at them might be recovered at low water. Hence the first connection of Shoeburyness with the artillery of the present day. A safe range can be found across the sands to almost any distance, and these marshes have therefore become the stage on which our great guns, such as Armstrongs and Whitworths, have made, so to speak, their first debut.

To reach Shoeburyness we take the railway which runs along the south coast of Essex and the northern bank of the Thames. As we near the mouth of the estuary we pass Southend, beloved of *trippers*, with its pier stretching out in its length of over a mile, and then cross the base of the ness itself, until we reach the sea again. On the south-eastern face of the ness we are at our journey's end, and the railway also, so far as the general public is concerned, has come to a full stop. We walk through the little town or village, and on the further side find what we may call the original settlement of gunnery experiments, now for the most part a group of barracks and quarters such as we might find at any military station. A few differences we notice, however, for as we pass through the barrack-yard we observe that one building is labelled 'Lecture-room,' and other evidences there are here and there that the artillerymen who are quartered here are not altogether engaged in their ordinary duties. We shall probably not linger long at the barracks, but we shall not fail to observe that the officers' quarters and mess-room occupy an extremely pleasant position on a wooded bank above the sea, and that at high-water the waves come rippling up to the very trees themselves. Further on are the houses appropriated to married officers, all alike situated on the pleasant sea-bank. We note many rowing and sailing boats lying off the mess-buildings. Alas! these craft sometimes prove a source of fatality to some of the young officers who, however well instructed they may be in their professional duties, yet know nothing of practical seamanship. Parties of young men in the prime of life, and just entering one of the finest branches of the British service, have gone off in high spirits for an afternoon's sail, and, caught by tide, or current, or squall, have never returned. More fortunate are those who have been able to make their way from a capsized boat to the Nore lightship, and there, perhaps, have remained a day or two until the gale had abated and they could be taken off.

But it is time we should leave the officers' quarters, and walk round the outside of the domain. We see in front of us huge wooden erections standing on the edge of the shore. These are conning towers from which, when practice is going on, a view is obtained of the direction of the shot. Beneath them are the batteries from which the guns are fired, and here go on the courses of instruction in practical artillery work, which are necessary for newly-joined officers.

But we have by no means seen the most important part of Shoeburyness when we have visited the barracks and the batteries. We notice that a line of rails winds its way in and out amongst guns and storehouses, and if we

have timed our visit right, we shall find a little miniature train just about to start for what is called *The New Range*. Taking our places in this train, we shall be carried first through the village and past the terminus of the public line, and then by a private railway which winds along amongst the corn-fields, until we reach a retired spot on the sea-shore hemmed in by lofty trees. In this private place are carried on all the experiments for which Shoeburyness is famous, and here both guns and explosives are tested to their utmost capability.

It is not altogether an unpicturesque spot at which we have arrived. Grouped together in the shaw to which we have already referred, are certain nice old farmhouses and other buildings which have been taken possession of by the military. The space in front would no doubt be an admirable rabbit-warren, only the whole ground is now covered by guns of various sizes, targets, shields, breast-works, and models of portions of iron-clad and other vessels. Amongst these run lines of rails by which guns and materials can be moved to any part of the ground; and in places there are overhead travelling cranes by which heavy cannon may be hoisted on to or off from their carriages, or into trucks, as need may require; and we again see lofty conning-towers, though target practice at a distance is not carried on here to the same extent as it is in that portion of the establishment which we first visited. The work at *The New Range* is connected rather with experiments as to the force of explosives and the penetrating power of projectiles, than with accuracy of aim and the direction of the shot.

We ought first to say a few words about modern explosives. Old-fashioned gunpowder, or *black powder*, as it is now usually called, is composed of saltpetre, charcoal, and sulphur, mixed together in the proportion usually of seventy-five, fifteen, and ten parts respectively. But explosives of the present day are composed of other substances. Cordite (*Journal*, No. 605, August 3, 1895), of which we now hear so much, is made of nitro-glycerine, gun-cotton, and mineral jelly in the proportion of fifty-seven, thirty-eight, and five parts. It is also steeped in a preparation of acetone. Gun-cotton itself is dipped in a mixture of three parts of sulphuric to one of nitric acid. The force of cordite over gunpowder may be judged from the following facts. A cartridge containing seventy grains of black powder fired in the ordinary rifle of the army will give what is called a muzzle velocity of one thousand three hundred and fifty feet a second, while thirty grains only of cordite will give a velocity of two thousand feet. In larger arms, little less than a pound of cordite fired in a twelve-pounder gun will give more velocity than four pounds of black powder fired in the same weapon. It need hardly be said that in the experiments at Shoeburyness it is the new-fashioned explosive which is chiefly used.

And now having some idea of what we are to see, let us walk round *The New Range*, and examine what is to be found there a little more in detail, bearing in mind that the work carried on is first the erection of bulkheads and iron plates, and then the knocking to pieces, or piercing of these erections. There is no regu-

lar order or arrangement in these matters. A target is built up in any convenient spot, and then a gun is brought to bear upon it from any suitable position.

Let us examine one of the guns, a breech-loader, and see what improvements have been made which may conduce to rapidity of fire. We see that in the older pattern three motions were necessary to open the breech. First the bar which is fixed across the base of the block had to be removed, then a half turn had to be given to the block to free it in its bed, and then it had to be pulled forward. Lastly, it had to be thrown back on its hinge so as to open the gun from end to end. We are shown that in later patterns the cavity or bed into which the block fits, is made in the form of a cone, so that the breech block itself can be turned outwards without any preliminary motion forward. In artillery work time is everything, and any one motion of the gunner's hands and arms saved is a point gained. Now let us look at the mechanism by which the recoil or backward movement of the gun is checked at the moment of firing. The gun slides in its cradle, and its recoil is counteracted by buffers which work in oil, something in the fashion of the oil springs which we see on doors. Iron spiral springs push the gun back again into place. Another interesting piece of mechanism is the electric machinery by which the gun is fired. When the recoil has taken place, the wire, along which runs the electric current, is pushed out of place, so that it is impossible to fire the gun, even though it be loaded, until it has been again fixed in its proper position on the cradle. Truly a modern cannon is a wonderful machine, and yet it is only a development from the sort of iron gas-pipe which was used in the middle ages. Hard by is a gun which has come to grief. In experiments which are carried on at Shoeburyness, guns are charged to their full, or, as in this case, more than their full strength. There is an ugly gash running down the outer case or jacket, as it is called, of the gun, and the latter has broken, and nearly jumped out of, its cradle. Nursery phraseology certainly comes in strongly in the technical slang of gunnery when we have to do with *Woolwich Infants*.

Let us turn now to some guns of quite a different pattern. They are old muzzle-loading ships' guns which have been rifled, and are now fitted on carriages which can elevate them at an angle of about seventy degrees. At this elevation they are capable of throwing a shell of four hundred pounds on to the deck of a ship which may be some thousands of yards distant. Such a projectile descending from above would be an unpleasant surprise to an iron-clad which had been putting confidence in her armoured turrets and sides alone. We can also see close by a specimen of the ingenious Moncrieff gun-carriage, in which the recoil of the gun is made to serve a useful purpose, and lowers the weapon into a sunk pit in which it can be safely loaded, and even sighted by means of mirrors, before it again pops its muzzle over the edge of the protecting bank or breast-work.

After looking at the guns we naturally go on to look at the targets at which they are fired.

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Targets at *The New Range* are not so much marks as specimens of armour plates and other protections. Some of these are built up with a strength which to the uninitiated appears to be proof against any attack. Here, for instance, we find a steel plate of eighteen inches in thickness, and behind this, six inches of iron, the whole backed up by huge balks of timber. But notwithstanding its depth, the enormous mass has been dented and cracked, and in places pierced. When we look at plates which are not quite so thick, we see that the shells have formed what are pretty and regular patterns, for small triangles of metal have been splintered off and turned back, so that the aperture is decorated with a circle of leaves, and resembles a rose with the centre cut out. Where the shell has entered the plate before it bursts, the pattern remains very perfect; but when it explodes as it touches the surface, some of the encircling leaves are entirely cut off.

One target is pointed out to us which represents the iron casing of the vulnerable portions of a torpedo boat, consisting of engine-room, boilers, and coal-bunkers. These compartments have been riddled again and again. Even a service-rifle bullet can penetrate one side, and a shell of the smallest size will go through both, for torpedo boats are not very heavily built.

Although the experiments which are carried on at Shoeburyness have almost entirely to do with ships' guns and ships' sides, yet they are carried on by officers and men of the Royal Artillery, though there are some naval officers amongst the experts who have to do with the professional secrets and inventions. That is to say, the guns are manned and fired by artillery gunners under the direction of artillery officers. That they should do so seems to be one illustration, amongst many, of their motto *Ubique*. They were probably the first occupants of the ground when the Government acquired it, and they have remained in possession of it. And yet considering to what end the experiments are directed, we may say that Shoeburyness is a point of junction between the two services. Perhaps the day is not far distant when the army and navy may be fused together in one body which, whether it operates by land or by sea for the defence of our rights and the safeguard of our country, will, we trust, ever remember that it exists for defence and not for defiance.

MR SOWERBY'S PLOT.

By JOHN K. LEYS, Author of *The Lawyer's Secret*, &c.

CHAPTER I.—HOW THE MINE WAS LAID.

MR ALFRED MOULTON, the editor and proprietor of *Financial Echoes*, lay back in his chair one hot July day, chewing the cud of a rather bitter reflection. His journal, in which he had invested every penny he possessed, had not proved a success. He longed to sell the paper; but purchasers were shy, very shy. Meantime, he was carrying it on at a slight loss, in the hope of being able to sell it by-and-by.

As Moulton was wondering how he was going to pull through the dead season, which was close at hand, the door opened, and a lanky

youth, who filled the various posts of manager, cashier, and sub-editor of the *Financial Echoes*, ushered a tall, well-dressed man into the room. The appearance of the stranger was such as to convince the beholder of his prosperity; and Moulton pulled himself together and bowed before asking his visitor to sit down.

'I didn't give my name to the clerk,' said the stranger, 'because I am here merely in the capacity of agent; and I should not wish it to be known that I ever visit the office of a financial newspaper. You will understand this when I tell you that my name is Sowerby—George Sowerby, the financier.'

This announcement did not make any great impression on the editor. He had heard of Sowerby as a clever and not very scrupulous fisher in the troubled waters of the City; and that was all. He looked at the financier now with some interest, and saw a large face, smooth shaven but for a heavy black moustache and very short coal-black whiskers. The man's manner was of that keen, self-assertive, aggressive type common among the worshippers of Mammon. The habit of trampling on everybody who would submit to the process had given Mr Sowerby the look of a bully, though it was veiled under a varnish of politeness.

He waited a moment, as if to give Mr Moulton time to be impressed by his personality, and continued: 'A friend of mine, named Smithson, wants to purchase a financial journal; and as I heard some time ago that your paper was for sale, I thought I would look in and see if terms could be arranged.'

This was good news to Mr Moulton; but he knew that it would never do to snap at the bait too readily. 'Well,' he replied, pulling his moustache with an air of indecision, some little time ago I did think of selling the paper. But I'm not quite sure now what I shall do. My own belief is that a financial crisis is at hand. The storm may burst at any moment; and in that case the *Financial Echoes* would be a very valuable property.'

'How so?'

Mr Moulton smiled and said nothing.

'What do you call valuable?' demanded the financier.

'I should say it would be worth five or six thousand pounds.'

'Let us talk sense,' said the City man coolly. 'You have hardly any circulation, and no advertisements worth speaking of. Three hundred pounds I should consider an outside price.'

'If you call that talking sense, you are mistaken,' said the proprietor of the *Financial Echoes* with some heat.

'What will you take, then?'

'I'll take a thousand pounds.'

'I'll give you seven-fifty.'

'Done!'

In five minutes more a memorandum of the bargain was signed; next day the price agreed upon was paid; and the day following, the lanky youth was promoted to the post of editor *pro tem*. That afternoon, Mr Sowerby, acting (as he said) as agent for the new proprietor, handed to his new editor—whose name was Daniels—an article to be printed as leader, in leaded type. It was rather a

peculiar sort of article, as Daniels observed at the time. It began by discussing the sinister rumours which had been circulating in the City for some days concerning the credit of various banking establishments. Then it went on to say that at such a crisis a financial journal had a heavy responsibility laid upon it, a duty to its subscribers and to the public; and that a sense of this responsibility compelled 'us' to say that these rumours, far from exaggerating, had understated the truth. As an example of the unsoundness of some bank in the City, an instance was given of one which was living literally from hand to mouth. The bulk of its capital was lent out at high rates of interest to Chinamen, South Americans, and Spaniards, who could not possibly pay up on demand, if at all. This was, as a matter of fact, the sort of security upon which credulous Englishmen lent their money, blindly trusting to the magic power of the word 'bank' to save them harmless. It was evident enough that the writer of the article had a particular establishment in his eye. A specific bank was referred to, though no name was given; and details of the assets and liabilities of the concern were quoted in such a way as to leave on the reader's mind a strong impression that they had been copied from a private balance-sheet that actually existed. It was plain from these figures that the bank aimed at was in a very risky state; but no hint was given as to which particular establishment it was.

The article was put in type; and Mr Sowerby condescended to ask Mr Daniels—as if entirely for his own amusement—some details as to the way of 'making up' a paper. This was on the afternoon of the day on which *Financial Echoes* went to press.

CHAPTER II.—HOW THE TRAIN WAS FIRED.

On the evening of the following day, Mr Benjamin Buddicombe was sitting in his library alone, smoking his post-prandial cigar. It was a good cigar; and Mr Buddicombe deserved it, for it had been a hard day with him. He was the only acting partner in the banking house of Buddicombe Brothers, and things had not been going well with the bank of late. People kept very small balances, as a rule; and to get decent interest in this country on good security seemed impossible. Hence Mr Buddicombe had been tempted to invest a good deal of money in South American securities; and the result was that the bank, though perfectly solvent, was in a position of unstable equilibrium. What Mr Buddicombe feared was a sudden demand on his resources; and just then storms were brewing in the City which made the banker anxious.

In addition to this, Mrs Buddicombe had that evening increased his anxieties by informing him that his eldest daughter, Claribel, the beauty of the family, was, or fancied herself to be, in love with the music-master. This intelligence put Mr Buddicombe into a rage. He knew nothing about any music-master. True, he had occasionally, when he happened to be going late into the City, met in the avenue a pale-faced, long-haired young man carrying a violin case; and had dimly conjectured that he was on his

way to give the children dancing lessons. Now he was told that the young man was a 'professor' of the violin; that he had been instructing Claribel in the use of that instrument for some months; that the two had 'occasionally' been left alone together for short periods; that something roused Mrs Buddicombe's suspicions; and that on inquiry these suspicions had been amply confirmed.

Of course all this made the banker very angry. He cursed Signor Rolfini with great heartiness, scolded his wife, blew up his daughter, and finished off by sending a cheque with a letter of dismissal for the musician, and issuing a decree that Clare—as she was generally called—was to set out for Ireland the very next day on a visit to her Aunt Bridget. This Aunt Bridget was a Miss O'Feely, a maiden lady, who lived all by herself in a great, gaunt, stone house, standing in a bog in the wildest part of County Galway. She was in reality Clare's grand-aunt, being Mrs Buddicombe's aunt, not her sister. If any of Mrs Buddicombe's children behaved very badly, they were packed off at once to Ballykilbeg—the gaunt stone house above mentioned—by way of punishment. In the present case, the sentence had the additional advantage that it would effectually prevent the two young idiots—as Mr Buddicombe regarded them—from meeting one another.

The banker had caused his wife to write a note to Miss O'Feely then and there, begging leave to send over dear Clare for a few days' change. Having despatched this missive to the post, and thus settled matters to his satisfaction, he sat down to dinner. Under the influence of food, wine, coffee, and tobacco, he soon attained a happier frame of mind. Mr Buddicombe was getting near the end of his after-dinner cigar, when a footman entered the room bearing a card on a salver.

'What the dickens can this mean?' he muttered to himself as he took up the card. 'Sowerby!—Sowerby! Show him in.'

Mr Buddicombe was more than surprised; he was agitated by this visit. Not twelve months before, Mr Sowerby had been his friend, and a frequent visitor at his house. More than this, Mr Sowerby had been a suitor for Claribel's hand; he had been madly in love with the girl; and at one time it seemed likely enough that his suit would be successful. The banker, however, had found out things about Mr Sowerby, and had cooled towards him perceptibly, finally going so far as to hint that his visits had better be discontinued.

And here was this man, without a word of warning, paying a visit at a quarter to ten o'clock at night, as if he had been a most intimate friend of the family. It was very strange, so strange that the banker had at once ordered the visitor to be admitted.

The two men met face to face in the middle of the large room.

'Buddicombe, have you an enemy?' was Mr Sowerby's greeting.

'Not that I know of; and yet—I don't know. Why do you ask?'

'You *must* have an enemy, a bold and a powerful one too. I have this very night, by the merest accident, discovered an infernal plot

against you—a plot to ruin you. It may be that I am able to prevent it, though I doubt it.'

'What on earth do you mean?'

'First tell me this: do you promise me absolute inviolate secrecy as to what I may say to you?'

'Yes; of course.'

'And do you promise that you will do your best to keep my name out of it, and—in fact—save me harmless?'

'Certainly.'

'Then I'll tell you.—You know *Financial Echoes*?'

'I have heard of the paper.'

'This is a copy of the next issue which is to come out to-morrow morning. That is the leading article. Just sit down and cast your eye over it and tell me what you think of it.'

With these words he handed a copy of the journal to the banker, who sat down and began to read the article, which was marked with a long blue-pencil line. The banker read the first few sentences; and then something made him start. He read a little further, and his face became white as his shirt-front; still he read on, and the beads of perspiration stood on his forehead, while the hand that held the paper trembled, so that he could hardly see the words.

'That wretch Harrington, my manager, has betrayed me!' he gasped out at length.

'Is it possible?' cried Sowerby. 'Then these figures are correct—they do really show the state of your business?'

Mr Buddicombe saw too late that he had made a fatal admission. He hung his head over the paper, and went on reading the article to the end, while Sowerby sat by in perfect silence. When the banker had finished the article, his eye, led by a continuation of the blue-pencil line, lighted upon a paragraph immediately under the closing lines of the leader, the first of a series of notes headed 'Straight Tips.' This paragraph contained the poison for which the preceding article served as vehicle. Taken by itself it seemed harmless enough. Placed where it had been placed, it made known to all men conversant with the City that the bank referred to in the article was that of Buddicombe Brothers.

The unhappy victim sprang to his feet with an oath. 'This shall not go forth to the world!' he shouted. 'This is a criminal conspiracy—I shall have the scoundrels arrested and brought up at the Old Bailey. There is law in England yet. The villains shall smart for this!'

'Yes; but meantime you will be irretrievably ruined!' cried Mr Sowerby. 'Just think a moment. You may apply for an injunction, or a warrant, or whatever you like, at ten o'clock to-morrow morning. But copies of *Financial Echoes* will be all over London, Liverpool, and Manchester by that time. More than that—the scoundrels tell me that they have got a list of your customers, from the treacherous clerk, no doubt, who supplied the figures for their libellous article. And their plan is to post a copy of the paper, marked like that, to each one of them.'

Again the banker sprang to his feet; but

this time his cry of rage and terror was inarticulate.

'Sit down, Buddicombe; calm yourself. Look the thing in the face,' said Mr Sowerby.

'Perhaps it's a lie,' gasped the quivering wretch.

Sowerby shook his head. 'Morrison & Sons were named to me,' he said, 'and Burtons, and Druce, and MacGregor, and—'

'There—that'll do. That's enough for me. I am ruined. I see that clearly enough. Some wretch—' He stopped, and threw a suspicious glance at his friend.

'How came you to know all this, Sowerby?' he asked.

'Partly by accident; and then when I found you were the man aimed at, I ferreted it out, in the hope of being able to serve you. I tried to bribe the conspirators; but it was of no use. One of them was quite determined. The other, I could see, wavered a bit. I spoke to him afterwards, and found that he could stop the impression from being posted. But when I talked of buying him, he named a sum so far beyond my powers, that—'

'How much was it?' asked the banker hoarsely.

The answer was given in a whisper; and it was received with an oath. 'That's as much as half my fortune!' cried Mr Buddicombe.

Mr Sowerby sighed, and mournfully shook his head. There was a minute or two of silence.

'Look here, Buddicombe,' he said, laying his hand on the banker's knee—'let me be your friend in this. We used to be friends, before somebody set you against me; why, I don't know. Perhaps I had a secret enemy as well as you. Never mind. Let by-gones be by-gones. Take me back into favour. Promise me your daughter—you know how I love her; and she was getting to be fond of me when you put your foot on it. Make me your son-in-law, and take me into partnership, and I'll crush these vipers for you. I will, even if I have to shoot them through the head.'

'That's nonsense!' said Buddicombe.

'Well, I'll spend every penny I have in bribing the one I know to be bribeable. But you must give me a bill to be discounted in case of accidents—in case of his wanting more money than I can find. I will not cash it without telling you. But I positively must have an acceptance for eighty thousand pounds—say seventy-nine thousand nine hundred odd pounds to make it look like a trade bill. With that in my pocket, I can make sure of stopping the libel. What do you say?'

The banker contented himself with shooting another suspicious glance at his visitor.

'Your bill won't be touched,' said Sowerby emphatically. 'Understand me; I'm not going to fight for a stranger; but I'll fight like a fiend incarnate for you as my father-in-law, and for a partnership in your house. The bank will weather the storm, I know, if we can only get over this pitfall. Once the settlements are signed and the marriage is celebrated, you shall have back your acceptance; never fear.'

Mr Buddicombe put his elbows on his knees, dropped his head into his hands, and tried to think. He more than suspected that Sowerby

was himself the prime mover in this diabolical plot, in spite of all his protestations. But what then? The banker knew that Sowerby was a determined, vindictive man, quite capable, if he were balked of his desire, of ruining the man who had stood in his way, for the mere pleasure of the thing. If he refused the scoundrel's terms, this too true libel would be in everybody's hands in the morning. There would certainly be a run on the bank, and the shutters must be put up at once. No doubt about that. Then, if he pretended to agree to the man's terms, to gain delay, meaning to cheat him of the promised reward, Sowerby would discount the bill, and he would be ruined in that way, just as certainly as he would be in the other. That, no doubt, was the object of the bill. But what was he to do? Oh, what was he to do?

'Time is passing, sir,' said Sowerby. 'I made it a point that the newspapers should not be posted before two o'clock; but it is getting late.'

'I cannot decide without consulting my daughter,' said the banker, in a voice hoarse with excitement.

He rang the bell and asked for his wife.

Ten minutes later, Claribel, in a lovely blue dressing-gown, her shining yellow hair coiled up anyhow on the top of her pretty head, her blue eyes wide open with astonishment, came into the room.

'Sit down, my child,' said the banker, leading her gently to a sofa. 'You remember Mr Sowerby?'

The girl blushed as she gave her old admirer her hand.

'Clare,' said her father gravely, 'I am on the brink of ruin; and, so far as I can see, you alone can save me. But you must not do violence to your inclinations. Understand that clearly. I would rather spend my old age in a workhouse than sacrifice you to a man whom you positively disliked.' With this prologue the banker proceeded to tell his daughter of the frightful danger that threatened him, and of the way of escape that had been suggested. He even told her of the bill of exchange arrangement, so that she might not be tempted to make an engagement that she did not mean to keep.

Of course the poor girl was dreadfully agitated, torn, as it were, by conflicting emotions.

'If you really loved me,' she said through her tears, turning to Mr Sowerby, 'you would not wish to—'

'Dear Miss Buddicombe! Dear Clare! It is the very strength and—and fierceness of my love that forces me to make this a condition of my helping your father. I shall have to pay away almost all I have to bribe this villain into silence. Why should I do that for a stranger? But if you promise to be my wife, what is there I would not do for you or yours?'

The painful scene lasted for some time; but finally the girl said that she could not stand by and see her father ruined, while she had power to prevent it. She had never disliked Mr Sowerby; and if he insisted on it, she would do what he asked her.

'But when?' cried the enraptured lover. 'In a fortnight?'

'Oh no! no! No!'

'In three weeks, then? A month? Really, I don't think I could wait longer than a month,' said Mr Sowerby; and, as he was clearly master of the situation, he had his way. The wedding-day was fixed for the 7th of September; and Mr Sowerby produced a slip of blue paper with a very heavy stamp at one end of it, and began to fill in the necessary words. This incident convinced the banker that Sowerby was himself at the bottom of the plot. But he was helpless—caught in a vice. He and his daughter sat side by side, gazing on the bit of paper which was to bind them as with an iron fetter.

The bill was signed. Claribel allowed her lover to kiss her cheek; and as the clock struck twelve the trio separated.

Next day the subscribers to *Financial Echoes* did not receive the paper as usual. The journal had ceased to exist.

NEW RAYS.

WILL men still say the light is good,
When nothing lies from it concealed;
When, thrown on living flesh and blood,
It shows a skeleton revealed?

We aye have loved the softened rays
Which will not let us see too much,
But wrap, as in a kindly haze,
The things that shrink from human touch.

We hide our skeletons away
When they have played their living part,
And shut them from the light of day
Within the twilight of the heart.

And all the wrongs that shock and shame
Our tender feeling or our pride—
The sullied honour, tarnished name—
In dim forgetfulness we hide.

But now we dread lest some fierce beam
More strong than our resistance prove,
And make us look where only seem
Unlovely relics of our love.

And yet, it may be, we were wise
To welcome each new ray of light,
And face with frank, courageous eyes
What now we bury out of sight.

'Tis not, perchance, true self-control,
Nor any part of charity,
To shut the windows of the soul
'Gainst all we do not choose to see.

New light, which shines on earth, may tell
How brighter rays, which shine above,
Can touch the lowest depths of hell,
Yet touch with tender tints of love.

C. J. BODEN.

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